WATER RESOURCES REVIEW for

FEBRUARY

1976

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

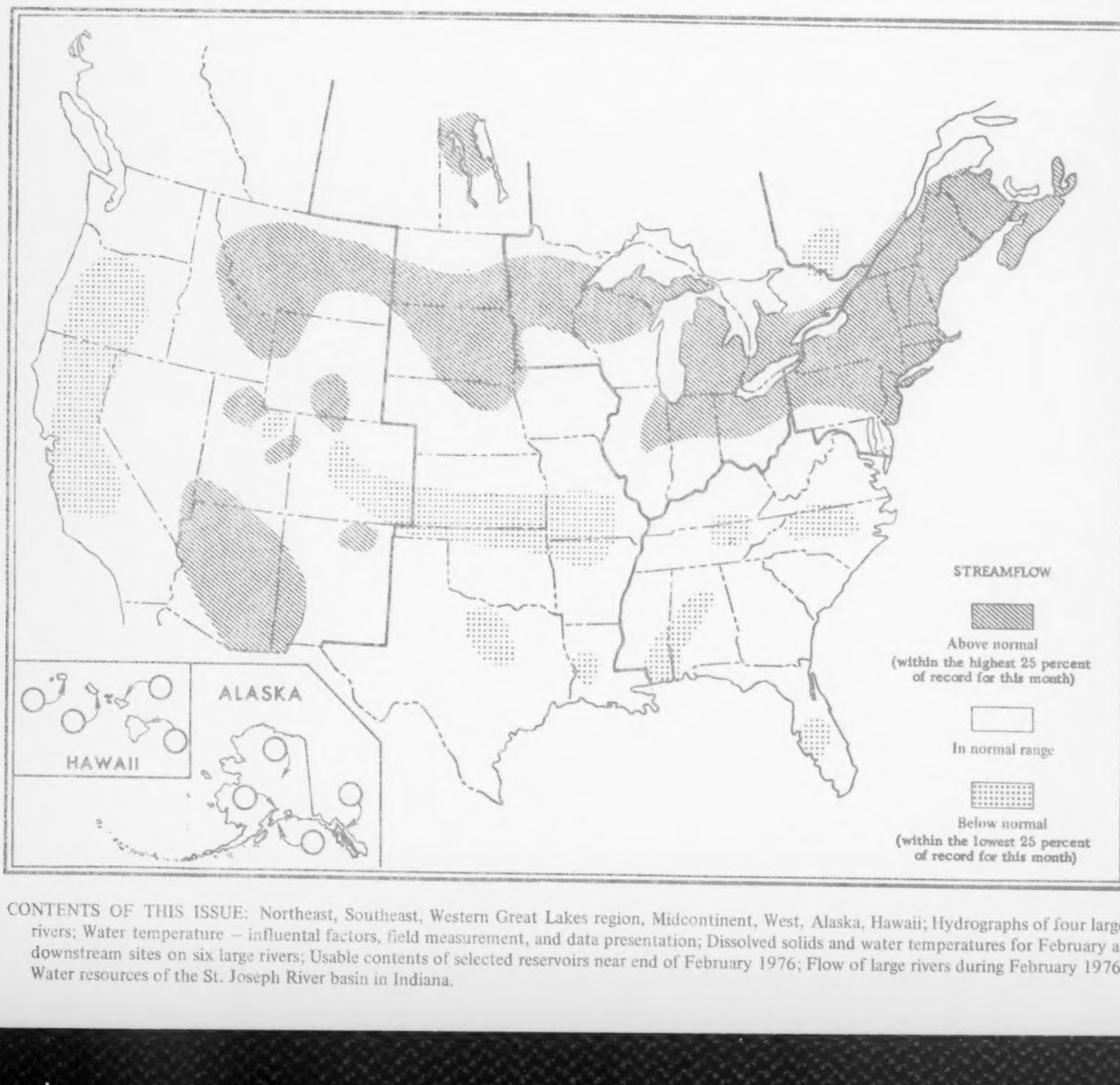
CANADA
DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES BRANCH

STREAMFLOW AND GROUND-WATER CONDITIONS

Streamflow generally increased in the Atlantic Provinces and on Vancouver Island, in southern Canada, and in many northeastern, central, and western States and Hawaii. Flows generally decreased in central and western Canada, and in several northwestern and southeastern States, and Alaska.

Monthly mean flows remained above the normal range in a large area in northwestern United States, and increased into that range in large areas in the Northeast, including the Atlantic Provinces, and in the Southwest. Below-normal flows persisted in a large area in California, and in smaller areas in southern Canada and some central States.

Flooding occurred in Indiana, Ohio, and North Carolina, and monthly mean discharge was highest of record for the month in part of Pennsylvania.



CONTENTS OF THIS ISSUE: Northeast, Southeast, Western Great Lakes region, Midcontinent, West, Alaska, Hawaii; Hydrographs of four large rivers; Water temperature – influental factors, field measurement, and data presentation; Dissolved solids and water temperatures for February at downstream sites on six large rivers; Usable contents of selected reservoirs near end of February 1976; Flow of large rivers during February 1976; Water resources of the St. Joseph River basin in Indiana.

NORTHEAST

[Atlantic Provinces and Quebec; Delaware, Maryland, New York, New Jersey, Pennsylvania, and the New England States]

STREAMFLOW GENERALLY INCREASED CONTRASEASONALLY, EXCEPT IN PARTS OF NEW BRUNSWICK AND QUEBEC IN THE NORTHERN PART OF THE REGION AND IN PARTS OF CONNECTICUT, MARYLAND, NEW JERSEY, AND PENNSYLVANIA IN THE SOUTHERN PART. MONTHLY MEAN FLOWS REMAINED ABOVE THE NORMAL RANGE IN PARTS OF NEW YORK, NEW JERSEY, PENNSYLVANIA, MARYLAND, THE NEW ENGLAND STATES, AND THE ATLANTIC PROVINCES, AND WERE HIGHEST FOR THE MONTH IN NORTHWESTERN PENNSYLVANIA. ABOVE-NORMAL TEMPERATURES CAUSED PRE-SEASONAL SNOWMELT RUNOFF IN SOME NORTHERN AND CENTRAL PARTS OF THE REGION. BELOW-NORMAL FLOW PERSISTED IN PART OF SOUTHERN QUEBEC.

In the upper reaches of Susquehanna River basin in New York and Pennsylvania, where snow cover of as much as 14 to 18 inches at the beginning of the month represented a potential flood threat, above-normal temperatures and some rain resulted in appreciable snowmelt runoff but no flooding occurred. Monthly mean discharge of Susquehanna River at Conklin, N.Y., increased sharply into the above-normal range and was 3 times the February median flow. Downstream at Harrisburg, Pa., mean flow also increased sharply, was more than twice the February median and was above the normal range. Monthly mean discharges at this index station have been greater than median for the past 10 months. In extreme northwestern Pennsylvania, where February median flow of Oil Creek at Rouseville usually is about 10 percent greater than median flow in January, monthly mean discharge was more than twice the flow during January, was 3 times the February median, and was highest for the month since records began in 1909.

In eastern New York, early snowmelt runoff also resulted in sharp increases in streamflow and breakup of ice cover. Ice-jam flooding occurred along the Hudson and Mohawk Rivers. At the index station, Hudson River at Hadley, where February flow generally is less than that during January, monthly mean discharge was almost twice the flow that occurred during January and was above the normal range. Similarly, in the northern part of the State, monthly mean flow of West Branch Oswegatchie River near Harrisville increased contraseasonally and was in the above-normal range.

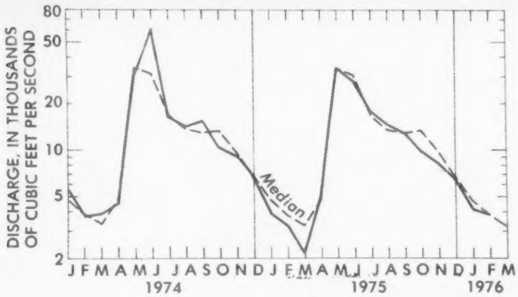
In the adjacent area of Vermont, monthly mean flow of White River at West Hartford also increased contraseasonally, was more than twice the February median, and was in the above-normal range. In western Massachusetts, where mean discharge of Ware River at Coldbrook (drainage area, 96.8 square miles) during January was highest for the month in record that began in 1928, high carryover flow augmented by snowmelt runoff, resulted in a monthly mean discharge of 457 cfs, highest of record for February, and a daily mean discharge of 952 cfs on the 2d, which is only 6 percent less than the maximum daily mean discharge of record.

Similarly, at the index station, Branch River at Forestdale, in adjacent Rhode Island, high carryover flow from the record-high monthly and daily mean discharges in January held monthly mean flow in the above-normal range for the 5th consecutive month. In adjacent Connecticut, monthly mean flows increased seasonally, except in the northwest corner of the State, were 2 to 3 times the February medians, and remained above the normal range.

In New Jersey and the adjacent area of southeastern New York, flow in the Delaware River basin increased sharply as a result of early snowmelt runoff augmented by rain, and monthly mean discharge at the index station at Trenton, N.J., on the mainstem, was in the above-normal range. Monthly mean flows at this site have been greater than their respective medians during the past 10 consecutive months. In northern New Jersey, monthly mean discharge of South Branch Raritan River near High Bridge remained above the normal range where it has been in 15 of the past 18 months.

In the extreme southern part of the region, monthly mean flows at the index stations, Potomac River near Washington, D.C., Seneca Creek at Dawsonville, Md., and Choptank River near Greensboro, Md., decreased contraseasonally from the high flows of January and were greater than median for the 15th consecutive month.

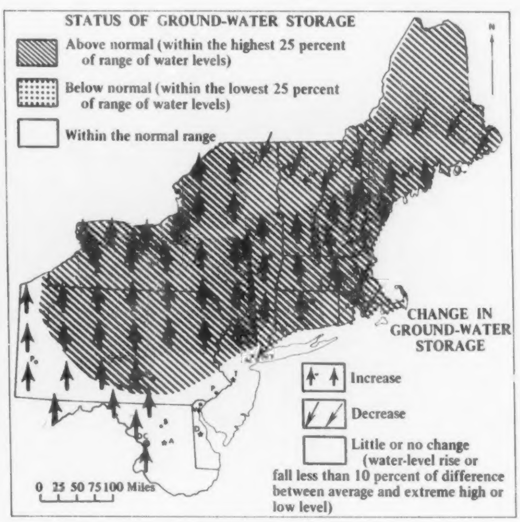
In the northern part of the region, monthly mean discharges in the Atlantic Provinces increased contraseasonally at all index stations (except Lepreau River at Lepreau, New Brunswick), were 2 to 3 times the February median flows, and were above the normal range. In eastern Quebec, monthly mean discharge of Outardes River at Outardes Falls continued to decrease seasonally but was greater than median for the 1st time in the past 6 months (see graph). In the southern part of the Province, south of St. Lawrence River, monthly mean flow of St. Francois River at Hemming Falls increased contraseasonally, was about 3 times median, and was above the normal range. Also in southern Quebec, but north of St. Lawrence River, monthly mean discharge of Coulonge River near Fort Coulonge decreased seasonally, remained in the below-normal



Monthly mean discharge of Outardes River at Outardes Falls, Quebec (Drainage area, 7,300 sq mi; 18,900 sq km)

range, and was less than median for the 9th consecutive month.

Ground-water levels rose in most of New York, Pennsylvania, western Maryland, and southern New England (see map), except in parts of southeastern



Map shows ground-water storage near end of February and change in ground-water storage from end of January to end of February.

Masschusetts where levels declined. Levels fell also in parts of northern New Hampshire and Vermont and central Maine. Monthend levels were above average in most of the region. Exceptions were the near-average levels in Maryland, Delaware, most of New Jersey, Long Island, N.Y., and in extreme southern and western Pennsylvania. Monthend levels were highest for end of February in 20 to 30 years in some wells in many parts of the region (especially in Connecticut)––a result of recharge (through unfrozen ground) by snowmelt and above-normal rains.

SOUTHEAST

[Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia]

STREAMFLOW DECREASED CONTRASEASONALLY IN ALABAMA, TENNESSEE, VIRGINIA, AND WEST VIRGINIA, AND WAS VARIABLE IN ALL OTHER STATES OF THE REGION. FLOWS REMAINED IN THE BELOW-NORMAL RANGE IN PART OF FLORIDA AND DECREASED INTO THAT RANGE IN PARTS OF ALABAMA, MISSISSIPPI, NORTH CAROLINA, AND TENNESSEE. MINOR FLOODING OCCURRED IN WESTERN NORTH CAROLINA.

In west-central Florida, where flow of Peace River at Arcadia normally increases during February, monthly mean discharge decreased, was only 35 percent of median, and remained below the normal range. In the southwestern part of the State, flow southward through the Tamiami Canal outlets, 40-mile bend to Monroe, decreased 5.8 cfs, to 6.2 cfs; 39 percent of normal. At Miami, in southeastern Florida, flow in Miami Canal decreased to 73 cfs; only 33 percent of normal. In northwestern Florida, and the adjacent area of southeastern Alabama, monthly mean flow of Shoal River near Crestview, Fla. decreased contraseasonally and was in the normal range, following 10 consecutive months in the above-normal range. Also in northern Florida, the discharge of Silver Springs decreased 24 cfs, to 640 cfs; 83 percent of normal, and the flow of Suwannee River at Branford increased seasonally, was 97 percent of normal, and remained in the normal range for the 6th consecutive month.

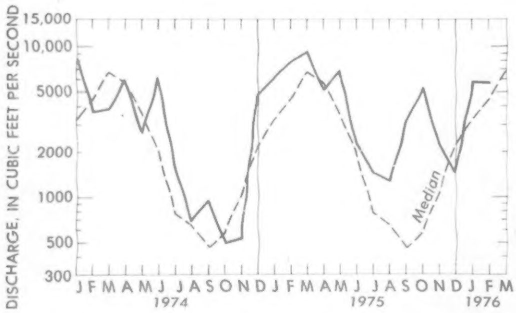
In central Alabama, where mean flow of Cahaba River at Centreville generally had been in the above-normal range since July 1975, monthly mean discharge decreased sharply into the below-normal range during February and was only 63 percent of median. Similarly, in the adjacent area of southeastern Mississippi, where mean flow of Pascagoula River at Merrill was above the normal range in 7 of the preceding 9 months, flow decreased contraseasonally into the below-normal range and was only 58 percent of median.

In Tennessee, mean flows decreased contraseasonally and were less than median at all index stations. In the eastern part of the State, where monthly mean discharge of Emory River at Oakdale normally increases in February, mean flow during the month was about 50 percent less than in January and was below the normal range.

In Neuse River basin in eastern North Carolina, low carryover flow from January and below-normal

precipitation in February resulted in a monthly mean discharge at the index station near Clayton that was below the normal range and only 63 percent of the February median. In the central part of the State, flow of South Yadkin River near Mocksville decreased contraseasonally and also was below the normal range. In the western mountain areas, intense rain on the 18th resulted in minor small-stream flooding.

In Kentucky, Virginia, and West Virginia, in the northern part of the region, monthly mean flows generally decreased from the relatively high mean flows of January, and were in the normal range. For example, in Potomac River basin, where monthly mean discharge in January at the index station at Paw Paw, W.Va., was above the normal range, mean flow in February decreased contraseasonally and was within the normal range (see graph).



Monthly mean discharge of Potomac River at Paw Paw, W. Va.
(Drainage area, 3,109 sq mi; 8,052 sq km)

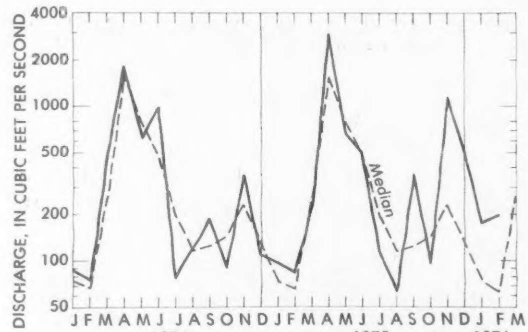
Ground-water levels declined or changed only slightly in most of the region. Levels rose in northern and southeastern parts of West Virginia, and rose slightly in the Piedmont of central Georgia. Monthend levels were below average in central and southern parts of West Virginia, and were above average in most other parts of the State. In southeastern Florida, levels ranged from about average to 1.2 feet below average.

WESTERN GREAT LAKES REGION

[Ontario; Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin]

STREAMFLOW GENERALLY INCREASED SEASONALLY IN SOUTHERN AND CENTRAL PARTS OF THE REGION BUT DECREASED IN ONTARIO. FLOWS REMAINED ABOVE THE NORMAL RANGE IN PARTS OF MINNESOTA AND WISCONSIN, AND INCREASED TO THAT RANGE IN MICHIGAN, OHIO, AND PARTS OF ILLINOIS AND INDIANA. FLOODING OCCURRED IN OHIO AND PARTS OF INDIANA.

In northern and central Minnesota, monthly mean flows increased contraseasonally and were above the normal range. In the adjacent areas of northern Wisconsin, flow at the index station, Jump River at Sheldon, also increased contraseasonally and remained in the above-normal range for the 4th consecutive month (see graph).



Monthly mean discharge of Jump River at Sheldon, Wis.
(Drainage area, 574 sq mi; 1,487 sq km)

In Michigan's Upper Peninsula, where monthly mean flow at the index station, Sturgeon River near Sidnaw, was in the normal range in January, flows decreased seasonally but were in the above-normal range. Elsewhere in the State, flows increased seasonally and were in the above-normal range with minor flooding occurring in parts of the River Raisin and Red Cedar River basins.

In eastern Ohio, flow at the index station, Little Beaver Creek near East Liverpool, increased seasonally and was 2 times median. Flows in the remainder of the State were above normal with minor flooding occurring throughout the State.

In Indiana, monthly mean flows increased seasonally and were in the normal range except in the east-central part of the State where monthly mean flow at the index station, Mississinewa River at Marion, increased sharply as a result of runoff from rain and snowmelt. The peak discharge at Marion was the 2d highest peak on record for February. Flood peaks on the lower Wabash and White Rivers occurred near the end of the month with lowland flooding common below Terre Haute on the Wabash and below Spencer on the White River.

In Illinois, flows at all index stations increased seasonally and were in the normal range except for Sangamon River at Monticello where monthly mean discharge increased into the above-normal range.

In southern Ontario, monthly mean flows at the index station, Saugeen River near Port Elgin, increased seasonally to the above-normal range. Flows at all other index stations in the Province decreased seasonally but were in the normal range.

Ground-water levels generally rose in Ohio, Indiana, Minnesota, and in Michigan's Lower Peninsula; changed only slightly in Wisconsin; and declined in Michigan's Upper Peninsula. Monthend levels were below average in Minnesota; were above average in Ohio; and near or above average in Michigan—highest of record for end of February in some wells in southern part of Michigan's Lower Peninsula. In the Minneapolis-St. Paul, Minn., area, levels in deep wells were generally unchanged in the Prairie du Chien-Jordan aquifer, and continued to rise slightly in the deeper Mt. Simon-Hinckley aquifer.

MIDCONTINENT

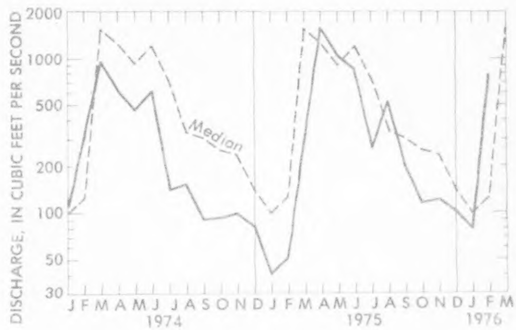
[Manitoba and Saskatchewan, Arkansas, Iowa, Kansas, Louisiana, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas]

STREAMFLOW INCREASED SEASONALLY IN IOWA, NEBRASKA, AND SOUTH DAKOTA, DECREASED SEASONALLY IN MANITOBA, AND WAS VARIABLE ELSEWHERE IN THE REGION. FLOWS REMAINED ABOVE THE NORMAL RANGE IN PARTS OF MANITOBA AND NORTH DAKOTA, AND INCREASED INTO THAT RANGE IN PARTS OF NEBRASKA AND SOUTH DAKOTA. BELOW-NORMAL FLOWS PERSISTED IN PARTS OF TEXAS, AND DEVELOPED IN PARTS OF ARKANSAS, MISSOURI, AND KANSAS, WHERE BELOW-NORMAL PRECIPITATION WAS REPORTED TO BE CONTINUING IN SOME AREAS.

In Cannonball River basin in southwestern North Dakota, where mean flow in January was more than 6 times median, temperatures were above normal in February and the resulting snowmelt runoff at the index station at Breien was 36 times the February median flow. Cumulative runoff at this site during the first 4 months of the 1976 water year was more than 3 times the median. In the eastern part of the State, mean flow of Red River of the North at Grand Forks decreased seasonally but remained in the above-normal range where the flow has been in 10 of the last 11 months, as a result of high tributary inflow from Minnesota.

In south-central Manitoba, monthly mean discharge of Waterhen River below Waterhen Lake continued to decrease seasonally, but high carryover flow from January held the mean flow in the above-normal range for the 20th time in the past 21 months. Also in the south-central part of the Province the level of Lake Winnipeg at Gimli averaged 714.91 feet above mean sea level, 0.04 foot higher than last month and 1.91 feet higher than the February long-term mean. The record of Lake Winnipeg levels began in 1913 at Winnipeg Beach.

In Bad River near Fort Pierre, in central South Dakota, the first flow during 1976 water year occurred during February as a result of early snowmelt runoff. The monthly mean discharge of 151 cfs was about 5,000 times the February median flow but was only about one-third of the February maximum monthly mean flow of record. In eastern South Dakota and the adjacent area of northwestern Iowa, monthly mean flow of Big Sioux River at Akron, Iowa, increased sharply as a result of runoff from rain and snowmelt near midmonth, and was 6 times the median flow for February (see graph).



Monthly mean discharge of Big Sioux River at Akron, Iowa
(Drainage area, 9,030 sq mi; 23,390 sq km)

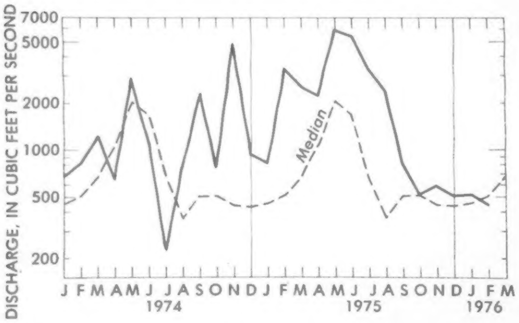
In northwestern Nebraska, monthly mean flow at the index station, Niobrara River above Box Butte Reservoir, increased seasonally and was near median, following 3 months of flows in the below-normal range. In the northeastern part of the State, monthly mean discharge of Elkhorn River at Waterloo increased sharply as a result of runoff from snowmelt near midmonth, and was above the normal range. Mean flows at this station were less than median in 6 of the preceding 7 months.

In Iowa and the adjacent area of northern Missouri, mean flows increased seasonally but were less than median flows for the month. In southern Missouri and the adjacent area of northern Arkansas, monthly mean flows at the respective index stations, Gasconade River at Jerome, Missouri, and Buffalo River near St. Joe, Arkansas, continued to decrease contraseasonally, as a result of below-normal precipitation, and were in the below-normal range.

In Kansas, the normal seasonal increase in streamflow during February did not occur because of the continued lack of precipitation. In the southern part of the State, mean flow of Arkansas River at Arkansas City decreased contraseasonally, was below the normal range, and was only 49 percent of median. In north-central Kansas, monthly mean flow of Little Blue River near Barnes also was below the normal range.

In Oklahoma, no surface runoff occurred for the 2d consecutive month and agricultural drought conditions were reported to be developing across the State. At the

index streamflow station, Washita River near Durwood, in southwestern Oklahoma, mean flow decreased contraseasonally and was less than median but remained within the normal range (see graph). Monthend contents of major reservoirs in the State were near or above average.



Monthly mean discharge of Washita River near Durwood, Okla. (Drainage area, 7,202 sq mi; 18,653 sq km)

In Louisiana, flows generally increased seasonally but were only about one-half of the February median discharges. In Calcasieu River basin, in the southwestern part of the State, low carryover flow from January contributed to the below-normal monthly mean discharge near Oberlin in February. In southeastern Louisiana and the adjacent area of Mississippi, high carryover flow from January in Pearl River basin held the stage near Bogalusa, La., slightly above National Weather Service flood stage of 15.0 feet during the period February 1 through 11. In northeastern Louisiana, runoff from intense rains that accompanied tornadoes February 17 and 18 resulted in bankfull stages in many streams.

In east-central Texas, low carryover flow from January and below-normal seasonal increase in flow held monthly mean discharge of North Bosque River near Clifton in the below-normal range for the 3d consecutive month. Also in eastern Texas, monthly mean discharge of Neches River near Rockland continued to increase seasonally but was only 45 percent of median as a result of low carryover flow from January.

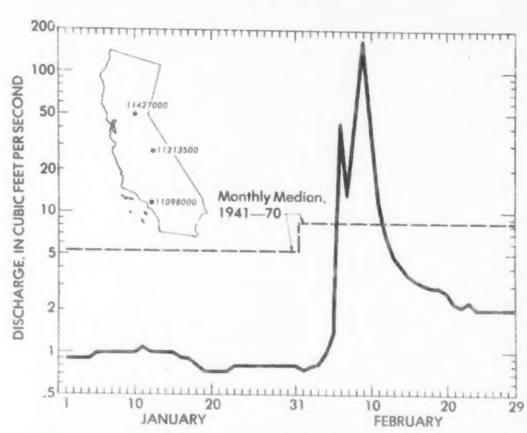
Ground-water levels generally rose in Iowa and Nebraska, and fell in North Dakota, Kansas, Oklahoma, Louisiana, and Texas (an exception was the slight rise at El Paso). Monthend levels were above average in Nebraska (except in areas of heavy pumpage); near or above average in North Dakota and Iowa; and below average in Kansas. In the rice-growing area of east-central Arkansas, the level in the shallow aquifer declined nearly 1 foot, and the level in the deep aquifer (Sparta Sand) rose 3 feet; monthend levels in the shallow aquifer were within the range of those of the past 12 years, whereas in the deep aquifer the levels were lowest of record for February. In the industrial aquifer of central Arkansas, the level rose 2 feet but was 10 feet below average. In southwestern Louisiana, levels in the Chicot aquifer continued their seasonal recovery. In Texas, monthend levels were above average at Austin, but were below average at San Antonio and were lowest of record for February at Houston and El Paso.

WEST

[Alberta, and British Columbia; Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming]

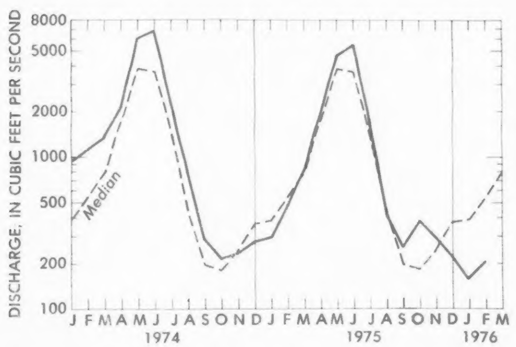
STREAMFLOW GENERALLY INCREASED SEASONALLY IN ARIZONA, CALIFORNIA, COLORADO, NEW MEXICO, AND NEVADA, DECREASED IN ALBERTA, BRITISH COLUMBIA, OREGON, AND WASHINGTON, AND WAS VARIABLE ELSEWHERE IN THE REGION. MONTHLY DISCHARGES REMAINED ABOVE THE NORMAL RANGE IN A LARGE AREA IN THE NORTHERN PART OF THE REGION, AND REMAINED BELOW THAT RANGE IN MUCH OF CALIFORNIA. WINTER AGRICULTURAL DROUGHT CONDITIONS IN PARTS OF THAT STATE WERE ALLEVIATED SLIGHTLY BY PRECIPITATION EARLY IN THE MONTH, BUT IN MOST OF NORTHERN AND CENTRAL CALIFORNIA, DRIER-THAN-NORMAL CONDITIONS PERSISTED AT MONTHEND.

In the southern coastal part of California, where monthly mean flow of Arroyo Seco near Pasadena (drainage area, 16.0 square miles) was 0.88 cfs (17 percent of median) in January, flow increased sharply as a result of runoff from rains of 4 to 5 inches February 3d and 4th on the coastal lowlands, and the monthly mean discharge of 18.0 cfs in February was one and one-half times median (see graph). In the south-central

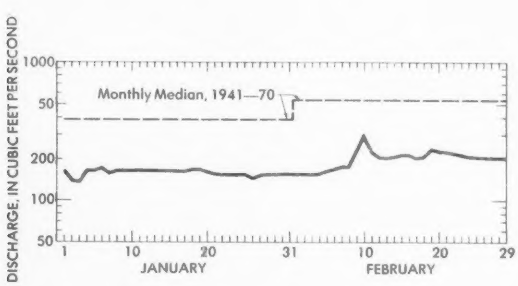


Daily mean discharge, Arroyo Seco near Pasadena, Calif. (station number 11098000), January – February 1976

part of the State, flow of Kings River above North Fork, near Trimmer (drainage area, 952 square miles) increased from 158 cfs (41 percent of median) in January, to 204 cfs (38 percent of median) in February, as a result of runoff from rain and snowmelt, but remained below the normal range (see graphs). In the Sacramento River basin



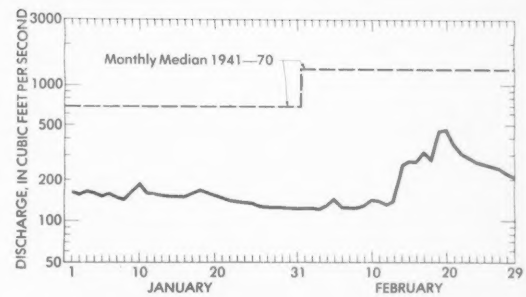
Monthly mean discharge of Kings River above North Fork, near Trimmer, Calif. (Drainage area, 952 sq mi; 2,466 sq km)



Daily mean discharge, Kings River above North Fork, near Trimmer, Calif. (station number 11213500), January–February 1976

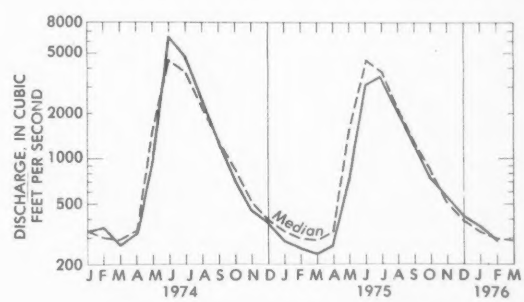
in northeastern California, monthly mean discharge of North Fork American River at North Fork Dam (drainage area, 342 square miles) increased seasonally from 148 cfs (22 percent of median) in January, to 220 cfs (17 percent of median) in February, and also remained in the below-normal range (see graph). Although February monthend flows in those index streams were appreciably higher than the January monthend flows, agricultural drought conditions were reported to be continuing in most of central and northern California.

In Oregon, monthly mean discharges decreased sharply and were below the normal range at the index stations, John Day River at Service Creek, Umpqua River near Elkton, and Willamette River at Salem. In the adjacent area of Washington, and also in British



Daily mean discharge, North Fork American River at North Fork Dam, Calif. (station number 11427000), January–February 1976

Columbia and Alberta, monthly mean flows generally decreased but were near or somewhat greater than median and in the normal range. For example, mean discharge of Bow River at Banff, Alberta, decreased from 110 percent of median in January to 96 percent of median in February (see graph).



Monthly mean discharge of Bow River at Banff, Alberta (Drainage area, 858 sq mi; 2,222 sq km)

In Montana and Idaho, mean flows increased at some index stations and decreased at others but generally remained in the above-normal range. Monthly mean discharge of Clark Fork at St. Regis, in northern Montana, west of the Continental Divide and near the Idaho border, decreased contraseasonally but remained above the normal range for the 9th consecutive month. In the adjacent area of Idaho, monthly mean flow of Clearwater River at Spalding also decreased contraseasonally and remained in the above-normal range for the 9th consecutive month.

In Utah, monthly mean discharges were variable. In the northern part of the State, mean flows increased and remained in the above-normal range at the index stations, Green River at Green River and Big Cottonwood Creek near Salt Lake City. In northeastern Utah, monthly mean discharge in Whiterocks River near Whiterocks decreased seasonally and remained in the

below-normal range, and in the southwestern part of the State, mean flow of Beaver River near Beaver decreased contraseasonally and remained in the normal range. In north-central Utah, the level of Great Salt Lake rose 0.40 foot during the month (to 4,201.20 feet above mean sea level), 1.30 feet higher than a year ago, 2.90 feet higher than the long-term February average level, and only 0.35 foot lower than the maximum level reached last year, 4,201.55 feet on June 15, which also was the highest level observed in 46 years.

In north-central Wyoming, mean flow of Tongue River near Dayton continued to decrease seasonally and remained in the normal range for the 3d consecutive month. In the south-central part of the State, monthly mean discharge in North Platte River above Seminoe Reservoir, near Sinclair, increased seasonally and was above the normal range.

In central and northern parts of Colorado, respectively, monthly mean flows of Arkansas River at Canon City, east of the Continental Divide, and Yampa River at Steamboat Springs, west of the Divide, were essentially the same as in January and remained below the normal range.

In north-central New Mexico, monthly mean flow of Rayado Creek at Sauble Ranch increased seasonally and remained in the above-normal range for the 3d consecutive month. In the Gila River basin, in the southwestern corner of the State, mean flow at the index station near Gila increased sharply, was 7 times the February median flow, and far above the normal range. Elsewhere in the State, flows were variable and within the normal range.

In Arizona, runoff from heavy rains early in the month resulted in sharp increases in streamflow throughout the State and in monthly mean discharges that were above the normal range at all index stations. In Gila River basin, the mean discharge at the station at head of Safford Valley, near Solomon, increased from below median in January to 5 times median in February. Similarly, in Verde River basin, in central Arizona, mean flow at the station below Tangle Creek, above Horseshoe Dam, increased sharply from below median in January to 7 times the median flow in February and far above the normal range. In the northeastern part of the State, where monthly flows at the index station, Little Colorado River near Cameron, were zero in November and December, 1975, and only 21 percent of median during January, monthly mean discharge in February increased sharply and was about 3 times the median flow for the month. In east-central Arizona, where mean flow of Salt River near Roosevelt was in the below-normal range in 4 of the past 5 months, monthly mean flow increased into the above-normal range in February and was more than twice the monthly median. In the extreme southern part of the State, where monthly mean discharges at the index station, San Pedro River at Charleston, have been less than median since October 1975, mean flow increased contraseasonally and was in the above-normal range.

Storage in most major reservoirs was near, or slightly above average, at monthend. In northern California, low runoff (inflow to reservoirs) and early use of stored water for irrigation have reduced storage to slightly below average. The net decrease in storage in the Colorado River Storage Project was 259,550 acre-feet during the month.

Ground-water levels rose in most of Utah, and in north-central and east-central Nevada. Levels generally fell in Washington, Idaho, Montana, and at Blanding and Logan in southeastern and northern parts of Utah. Monthend levels were above average in most of Washington, Idaho, Montana, and north-central and east-central Nevada; and were below average in Utah (except at Blanding and Logan), and in southern New Mexico. In southern Arizona, levels in the observation wells at Elfrida, Avra Valley, and Tucson (no. 2), were lowest of record for February.

ALASKA

Streamflow continued to decrease seasonally except in the southeastern coastal area where monthly mean discharge of Gold Creek near Juneau increased, as a result of runoff from above-normal precipitation, and was twice the February median discharge. In Tanana River basin, in east-central Alaska, monthly mean discharge on the mainstem at Nenana decreased seasonally, as a result of below-normal temperatures, and was less than median. Mean flows at this index station were above the normal range in 6 of the past 7 months. In the tributary basin of Chena River, monthly mean flow at Fairbanks continued to decrease seasonally and remained below median for the 5th consecutive month.

Ground-water levels in the Anchorage area declined seasonally in water-table wells and declined slightly in the artesian aquifer as a result of pumping for domestic uses.

HAWAII

Streamflow increased at index stations on the islands of Kauai, Maui, and Oahu, and decreased on the island of Hawaii, but all monthly mean discharges were in the normal range. Intense rains fell on the leeward side of Oahu on the 6th and 7th, resulting in peak discharges

that were highest of record at most gaging stations in that area. Many homes were reported to have been inundated in northern and western coastal areas of the island, and rainfall of 18 inches in 24 hours was reported to have fallen on the 7th at the western coastal town of Waianae, about 3 miles west of Lualualei Naval Depot.

METRIC EQUIVALENTS OF UNITS USED IN THE WATER RESOURCES REVIEW

(Round-number conversions, to nearest four significant figures)

1 foot = 0.3048 metre 1 mile = 1.609 kilometres
1 acre = 0.4047 hectare = 4,047 square metres
1 square mile (sq mi) = 259 hectares = 2.59 square kilometres (sq km)
1 acre-foot (ac-ft) = 1,233 cubic metres
1 million cubic feet (mcf) = 28,320 cubic metres
1 cubic foot per second (cfs) = 0.02832 cubic metres per second = 1.699 cubic metres per minute
1 second-foot-day (cfsd) = 2,447 cubic metres
1 million gallons (mg) = 3,785 cubic metres = 3.785 million litres
1 million gallons per day (mgd) = 694.4 gallons per minute (gpm) = 2.629 cubic metres per minute = 3,785 cubic metres per day

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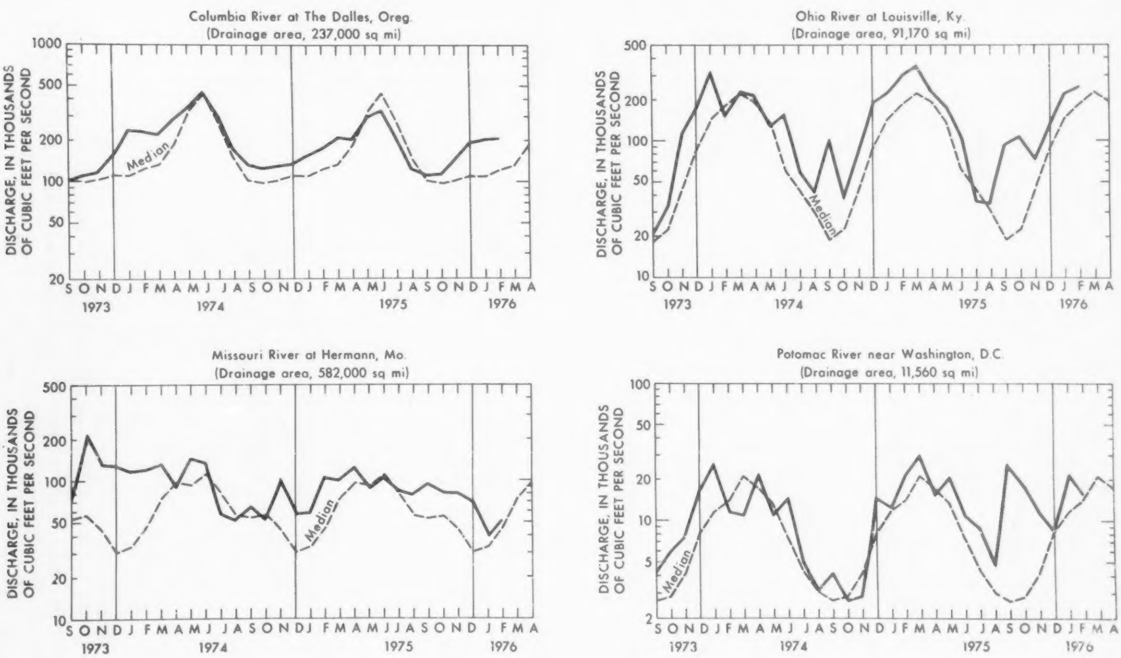
HYDROGRAPHS OF FOUR LARGE RIVERS



NEW MANUAL ON MEASUREMENT AND REPORTING WATER TEMPERATURES

A new manual by the U.S. Geological Survey has been published in its series on techniques describing procedures for planning and executing specialized work in water-resources investigations. The new manual contains suggested procedures for collecting and reporting of water-temperature data from streams, lakes and reservoirs, estuaries, and ground water. Among the topics discussed are the selection of equipment and measuring sites, objectives and accuracy of measurements, and data processing and presentation. Background information on the influence of temperature on water quality and on the factors influencing water temperature is also presented.

The water-temperature manual by H.H. Stevens, Jr., J.F. Ficke, and G.F. Smoot, may be purchased for $1.60 from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. The GPO Stock No. is 024-001-02711-9, and the title is *Water temperature—influential factors, field measurement, and data presentation:* U.S. Geological Survey Techniques of Water-Resources Investigations Book 1, Chapter D1 (65 pages, 1975).

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR FEBRUARY AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	February data of following calendar years	Stream discharge during month	Dissolved-solids concentration during month[a]		Dissolved-solids discharge during month[a]			Water temperature during month		
			Mean (cfs)	Minimum (mg/l)	Maximum (mg/l)	Mean (tons per day)	Minimum (tons per day)	Maximum (tons per day)	Mean, in °C	Minimum, in °C	Maximum, in °C
	NORTHEAST										
01463500	Delaware River at Trenton, N.J. (Morrisville, Pa.)	1976	25,550	72	100	5,670	647	9,580	3.0 (38°F)	0.5 (33°F)	5.5 (42°F)
		1945–75	13,320 [10,620[b]]	61 (Feb.21-28,1954)	134 (Feb.27-28,1951)	......	736 (Feb. 2, 1966)	8,150 (Feb. 8, 1965)	......	0 (32°F)	8.5 (48°F)
04264331	St. Lawrence River at Cornwall, Ontario, near Massena, N.Y. (streamflow station formerly at Ogdensburg, N.Y.)	1976	260,000	167	168	118,000	110,000	122,000	0.5 (33°F)	0.5 (33°F)	0.5 (33°F)
		1966–74	245,600 [226,000[b]]	......	......	......	......	......	......	0 (32°F)	1.0 (34°F)
	SOUTHEAST										
07289000	Mississippi River at Vicksburg, Miss	1976	622,400 [652,600[b]]	171	207	329,000	277,000	418,000	7.0 (44°F)	4.5 (40°F)	10.5 (51°F)
	WESTERN GREAT LAKES REGION										
03612500	Ohio River at lock and dam 53, near Grand Chain, Ill. (25 miles west of Paducah, Ky.; streamflow station at at Metropolis, Ill.)	1976	519,600	148	185	......	134,000	360,000	......	2.0 (36°F)	9.0 (48°F)
		1955–74	449,400 [407,600[b]]	98 (Feb. 9, 1957)	308 (Feb. 24, 1967)	......	44,900 (Feb. 2, 1955)	419,000 (Feb. 8, 1974)	......	0 (32°F)	9.0 (48°F)
	MIDCONTINENT										
06934500	Missouri River at Hermann, Mo. (60 miles west of St. Louis, Mo.)	1976	49,600 [45,700[b]]	330	433	52,000	37,800	74,400	5.0 (41°F)	0 (32°F)	9.0 (48°F)
	WEST										
14128910	Columbia River at Warrendale, Oreg. (30 miles east of Portland, Oreg.; streamflow station at The Dalles, Oreg.)	1976	211,500	87	96	51,400	42,300	59,600	6.5 (44°F)	6.0 (43°F)	7.0 (44°F)
		1968–73	164,800 [126,600[b]]	......	......	......	......	......	......	1.0 (34°F)	6.0 (43°F)

[a]Dissolved-solids concentrations when not analyzed directly, are calculated on basis of measurements of specific conductance.
[b]Median of monthly values for 30-year reference period, water years 1941–70, for comparison with data for current month.

Provisional data; subject to revision

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF FEBRUARY 1976

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	End of Jan. 1976	End of Feb. 1976	End of Feb. 1975	Average for end of Feb.	Normal maximum
	Percent of normal maximum				
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	77	87	49	57	223,400 (a)
QUEBEC					
Allard (P)	66	54	34	44	280,600 ac-ft
Gouin (P)	73	60	58	74	6,954,000 ac-ft
MAINE					
Seven reservoir systems (MP)	49	50	35	39	178,500 mcf
NEW HAMPSHIRE					
First Connecticut Lake (P)	41	23	22	17	3,330 mcf
Lake Francis (FPR)	51	39	28	29	4,326 mcf
Lake Winnipesaukee (PR)	62	63	42	50	7,200 mcf
VERMONT					
Harriman (P)	15	14	26	31	5,060 mcf
Somerset (P)	79	75	63	50	2,500 mcf
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	77	78	75	68	3,394 mcf
NEW YORK					
Great Sacandaga Lake (FPR)	38	44	39	35	34,270 mcf
Indian Lake (FMP)	59	60	51	40	4,500 mcf
New York City reservoir system (MW)	88	98	92	.....	547,500 mg
NEW JERSEY					
Wanaque (M)	100	101	101	80	27,730 mg
PENNSYLVANIA					
Pymatuning (FMR)	84	99	90	86	8,191 mcf
Wallenpaupack (P)	66	65	68	50	6,875 mcf
MARYLAND					
Baltimore municipal system (M)	100	100	96	89	85,340 mg
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	82	76	94	84	12,580 mcf
Narrows (Badin Lake) (P)	91	93	95	102	5,617 mcf
High Rock Lake (P)	56	55	70	78	10,230 mcf
SOUTH CAROLINA					
Lake Murray (P)	78	80	87	68	70,300 mcf
Lakes Marion and Moultrie (P)	61	71	93	75	81,100 mcf
SOUTH CAROLINA--GEORGIA					
Clark Hill (FP)	69	69	79	64	75,360 mcf
GEORGIA					
Burton (PR)	67	68	82	67	104,000 ac-ft
Sinclair (MPR)	86	88	100	86	214,000 ac-ft
Lake Sidney Lanier (FMPR)	65	63	63	56	1,686,000 ac-ft
ALABAMA					
Lake Martin (P)	85	76	96	76	1,373,000 ac-ft
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	38	46	46	38	1,156,000 cfsd
Douglas Lake (FPR)	30	20	24	22	703,100 cfsd
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	51	51	56	49	510,300 cfsd
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	40	47	51	41	1,452,000 cfsd
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	45	53	61	48	745,200 cfsd
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	68	51	38	23	15,900 mcf
Wisconsin River (21 reservoirs) (PR)	50	28	17	15	17,400 mcf
MINNESOTA					
Mississippi River headwater system (FMR)	17	13	23	18	1,640,000 ac-ft
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	86	85	83	.....	22,640,000 ac-ft
SOUTH DAKOTA					
Angostura (I)	64	67	66	76	127,600 ac-ft
Bell Fourche (I)	51	56	51	53	185,200 ac-ft
Lake Francis Case (FIP)	64	77	72	73	4,834,000 ac-ft
Lake Oahe (FIP)	82	84	84	.....	22,530,000 ac-ft
Lake Sharpe (FIP)	104	102	102	94	1,725,000 ac-ft
Lewis and Clarke Lake (FIP)	96	79	78	84	477,000 ac-ft
MIDCONTINENT REGION—Continued					
NEBRASKA					
Lake McConaughy (IP)	77	80	77	73	1,948,000 ac-ft
OKLAHOMA					
Eufaula (FPR)	79	77	117	85	2,378,000 ac-ft
Keystone (FPR)	79	81	117	93	661,000 ac-ft
Tenkiller Ferry (FPR)	102	96	110	86	628,200 ac-ft
Lake Altus (FIMR)	94	95	53	51	134,500 ac-ft
Lake O'The Cherokees (FPR)	73	73	108	79	1,492,000 ac-ft
OKLAHOMA--TEXAS					
Lake Texoma (FMPRW)	86	86	104	87	2,722,000 ac-ft
TEXAS					
Bridgeport (IMW)	87	85	65	42	386,400 ac-ft
Canyon (FMR)	93	93	99	65	385,600 ac-ft
International Amistad (FIMPW)	100	100	100	67	3,497,000 ac-ft
International Falcon (FIMPW)	94	86	100	70	2,667,000 ac-ft
Livingston (IMW)	100	100	100	68	1,788,000 ac-ft
Possum Kingdom (IMPRW)	91	90	94	97	569,400 ac-ft
Red Bluff (PI)	35	35	56	31	307,000 ac-ft
Toledo Bend (P)	90	92	97	77	4,472,000 ac-ft
Twin Buttes (FIM)	99	100	100	10	177,800 ac-ft
Lake Kemp (IMW)	82	80	49	89	268,000 ac-ft
Lake Meredith (FMW)	43	43	48	37	821,300 ac-ft
Lake Travis (FIMPRW)	93	94	100	79	1,144,000 ac-ft
THE WEST					
WASHINGTON					
Ross (PR)	83	74	38	41	1,052,000 ac-ft
Franklin D. Roosevelt Lake (IP)	97	64	83	62	5,232,000 ac-ft
Lake Chelan (PR)	76	70	22	35	676,100 ac-ft
Lake Cushman	94	80	81	86	359,500 ac-ft
Lake Merwin (P)	96	99	102	96	246,000 ac-ft
IDAHO					
Boise River (4 reservoirs) (FIP)	66	66	68	64	1,235,000 ac-ft
Coeur d'Alene Lake (P)	73	56	29	52	238,500 ac-ft
Pend Oreille Lake (FP)	59	57	36	55	1,561,000 ac-ft
IDAHO--WYOMING					
Upper Snake River (9 reservoirs) (MP)	65	65	73	67	4,689,000 ac-ft
WYOMING					
Boysen (FIP)	72	64	69	66	802,000 ac-ft
Buffalo Bill (IP)	64	59	62	63	421,300 ac-ft
Keyhole (F)	67	68	69	39	199,900 ac-ft
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	64	68	64	45	3,056,000 ac-ft
COLORADO					
John Martin (FIR)	2	3	2	18	364,400 ac-ft
Taylor Park (IR)	60	58	47	55	106,200 ac-ft
Colorado–Big Thompson project (I)	69	69	69	56	722,600 ac-ft
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Navajo, and Blue Mesa Reservoirs (IFPR)	80	79	69	.....	31,280,000 ac-ft
UTAH--IDAHO					
Bear Lake (IPR)	76	74	77	56	1,421,000 ac-ft
CALIFORNIA					
Folsom (FIP)	53	57	62	58	1,000,000 ac-ft
Hetch Hetchy (MP)	36	30	22	27	360,400 ac-ft
Isabella (FIR)	31	30	50	26	551,800 ac-ft
Pine Flat (FI)	47	50	55	54	1,014,000 ac-ft
Clair Engle Lake (Lewiston) (P)	75	75	79	84	2,438,000 ac-ft
Lake Almanor (P)	64	56	81	48	1,036,000 ac-ft
Lake Berryessa (FIMW)	85	83	96	88	1,600,000 ac-ft
Millerton Lake (FI)	71	68	61	64	503,200 ac-ft
Shasta Lake (FIPR)	68	67	82	75	4,377,000 ac-ft
CALIFORNIA--NEVADA					
Lake Tahoe (IPR)	67	66	69	54	744,600 ac-ft
NEVADA					
Rye Patch (I)	98	104	64	.....	157,200 ac-ft
ARIZONA--NEVADA					
Lake Mead and Lake Mohave (FIMP)	78	79	77	64	27,970,000 ac-ft
ARIZONA					
San Carlos (IP)	11	12	23	17	1,093,000 ac-ft
Salt and Verde River system (IMPR)	50	62	53	42	2,073,000 ac-ft
NEW MEXICO					
Conchas (FIR)	24	24	37	77	352,600 ac-ft
Elephant Butte and Caballo (FIPR)	30	30	20	29	2,539,000 ac-ft

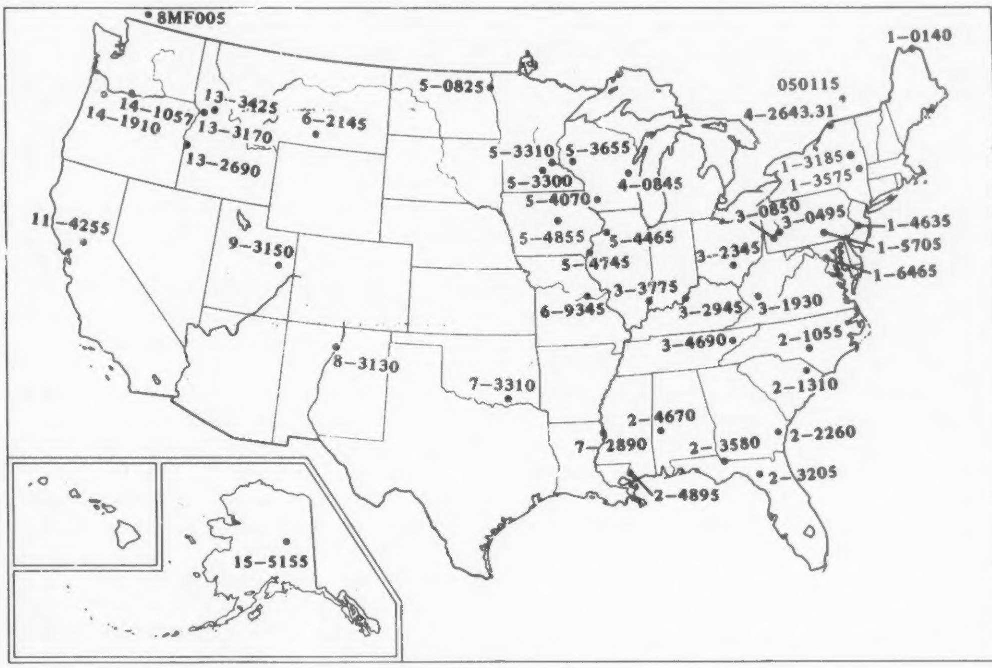
[a]Thousands of kilowatt-hours

FLOW OF LARGE RIVERS DURING FEBRUARY 1976

Station number*	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1970 (cfs)	February 1976: Monthly discharge (cfs)	Percent of median monthly discharge, 1941–70	Change in discharge from previous month (percent)	Discharge near end of month (cfs)	(mgd)	Date
1–0140	St. John River below Fish River at Fort Kent, Maine.	5,690	9,397	4,421	230	+87	3,250	2,100	29
1–3185	Hudson River at Hadley, N.Y	1,664	2,791	3,800	219	+82	3,800	2,500	29
1–3575	Mohawk River at Cohoes, N.Y	3,456	5,450	16,100	334	+120	....	....	....
1–4635	Delaware River at Trenton, N.J	6,780	11,360	26,600	250	+32	27,500	17,800	27
1–5705	Susquehanna River at Harrisburg, Pa.	24,100	33,670	89,690	245	+132	76,000	49,000	29
1–6465	Potomac River near Washington, D.C.	11,560	[1] 10,640	15,880	113	-26	9,710	6,280	29
2–1055	Cape Fear River at William O. Huske Lock near Tarheel, N.C.	4,810	4,847	6,086	69	-25	2,420	1,560	29
2–1310	Pee Dee River at Peedee, S.C	8,830	9,098	12,000	89	-10	6,690	4,320	25
2–2260	Altamaha River at Doctortown, Ga.	13,600	13,380	21,770	115	+18	13,700	8,850	25
2–3205	Suwannee River at Branford, Fla	7,740	6,775	7,520	97	+34	6,170	3,990	26
2–3580	Apalachicola River at Chattahoochee, Fla.	17,200	21,690	33,500	113	+6	34,800	22,500	27
2–4670	Tombigbee River at Demopolis lock and dam near Coatopa, Ala.	15,400	21,700	38,100	82	-19	52,200	33,700	25
2–4895	Pearl River near Bogalusa, La	6,630	8,533	10,060	67	-24	....	.....	....
3–0495	Allegheny River at Natrona, Pa	11,410	[1] 18,700	52,090	187	+81	76,800	49,600	26
3–0850	Monongahela River at Braddock, Pa.	7,337	[1] 11,950	25,050	140	-1	20,000	12,900	26
3–1930	Kanawha River at Kanawha Falls, W.Va.	8,367	12,370	18,540	94	-1	16,200	10,500	27
3–2345	Scioto River at Higby, Ohio	5,131	4,337	12,910	167	+51	20,000	12,900	25
3–2945	Ohio River at Louisville, Ky[2]	91,170	110,600	244,900	134	+9	410,300	265,200	24
3–3775	Wabash River at Mount Carmel, Ill.	28,600	26,310	56,600	171	+53	101,000	65,300	29
3–4690	French Broad River below Douglas Dam, Tenn.	4,543	[1] 6,528	8,330	79	-12	....	.....	....
4–0845	Fox River at Rapide Croche Dam, near Wrightstown, Wis.[2]	6,150	4,142	4,100	113	-3	....	.....	....
02MC002 (4–2643.31)	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y.[3]	299,000	239,100	260,300	115	+5	271,000	175,000	29
050115	St. Maurice River at Grand Mere, Quebec.	16,300	24,900	6,370	83	+10	24,300	15,700	26
5–0825	Red River of the North at Grand Forks, N. Dak.	30,100	2,439	1,661	226	-3	1,700	1,100	29
5–3300	Minnesota River near Jordan, Minn ..	16,200	3,306	609	114	+37	1,200	780	26
5–3310	Mississippi River at St. Paul, Minn ...	36,800	[1] 10,230	5,970	140	+11	7,560	4,890	25
5–3655	Chippewa River at Chippewa Falls, Wis.	5,600	5,062	4,601	157	+16	....	.....	....
5–4070	Wisconsin River at Muscoda, Wis	10,300	8,457	7,993	132	+22	....	.....	....
5–4465	Rock River near Joslin, Ill	9,520	5,288	4,034	83	+8	9,000	5,820	29
5–4745	Mississippi River at Keokuk, Iowa ...	119,000	61,210	49,190	123	+40	77,000	50,000	29
5–4855	Des Moines River below Raccoon River at Des Moines, Iowa.	9,879	3,796	869	67	+123	2,410	1,560	29
6–2145	Yellowstone River at Billings, Mont.	11,795	6,754	3,409	128	+3	3,200	2,100	29
6–9345	Missouri River at Hermann, Mo	528,200	78,480	50,090	110	+24	63,600	41,100	25
7–2890	Mississippi River at Vicksburg, Miss.[4]	1,144,500	552,700	622,400	95	-13	900,000	582,000	29
7–3310	Washita River near Durwood, Okla ..	7,202	1,379	443	87	-15	440	280	29
8–3130	Rio Grande at Otowi Bridge, near San Ildefonso, N.Mex.	14,300	1,530	763	103	+21	....	.....	....
9–3150	Green River at Green River, Utah ..	40,600	6,369	3,797	161	+42	4,100	2,650	29
11–4255	Sacramento River at Verona, Calif ...	21,257	18,370	10,600	28	-12	10,300	6,660	26
13–2690	Snake River at Weiser, Idaho	69,200	17,670	23,080	127	+4	22,550	14,570	25
13–3170	Salmon River at White Bird, Idaho ..	13,550	11,060	4,834	107	-10	4,840	3,130	25
13–3425	Clearwater River at Spalding, Idaho ..	9,570	15,320	18,110	198	-15	14,700	9,500	25
14–1057	Columbia River at The Dalles, Oreg.[5]	237,000	194,000	210,900	167	+5	....	.....	....
14–1910	Willamette River at Salem, Oreg	7,280	23,370	21,100	48	-71	26,600	17,200	29
15–5155	Tanana River at Nenana, Alaska	25,600	24,040	5,590	89	-19	5,000	3,230	28
8MF005	Fraser River at Hope, British Columbia.	78,300	95,300	36,800	123	-10	34,500	22,300	27

[1] Adjusted.
[2] Records furnished by Corps of Engineers.
[3] Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5] Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.
*The U.S. station numbers as listed in this table are in a shortened form previously in use, and used here for simplicity of tabular and map presentation. The full, correct number contains 8 digits and no punctuation marks. For example, the correct form for station number 1–3185 is 01318500.

SELECTED STREAM-GAGING STATIONS ON LARGE RIVERS



Location of stream-gaging stations on large rivers listed in table on page 12.

WATER RESOURCES REVIEW
FEBRUARY 1976

Based on reports from the Canadian and U.S. field offices; completed March 5, 1976

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EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for February based on 22 index stream-gaging stations in Canada and 130 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations which are located near the points shown by the arrows.

Streamflow for February 1976 is compared with flow for February in the 30-year reference period 1931–60 or 1941–70. Streamflow is considered to be *below the normal range* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow for February is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile).

Flow higher than the lower quartile but lower than the upper quartile is described as being within the *normal range*. In the Water Resources Review the median is obtained by ranking the 30 flows of the reference period in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the median.

The normal is an average (but not an arithmetic average) or middle value; half of the time you would expect the February flows to be below the median and half of the time to be above the median. Shorter reference periods are used for the Alaska index stations because of the limited records available.

Statements about *ground-water levels* refer to conditions near the end of February. Water level in each key observation well is compared with average level for the end of February determined from the entire past record for that well or from a 20-year reference period, 1951–70. *Changes in ground-water levels,* unless described otherwise, are from the end of January to the end of February.

The Water Resources Review is published monthly. Special-purpose and summary issues are also published. Issues of the Review are free on application to the Water Resources Review, U.S. Geological Survey, Reston, Virginia 22092.

WATER RESOURCES OF THE ST. JOSEPH RIVER BASIN IN INDIANA

The accompanying abridged excerpt and diagram are from the report, *Water resources of the St. Joseph River basin in Indiana*, by J.P. Reussow and P.B. Rohne, Jr.: U.S. Geological Survey Hydrologic Investigations Atlas HA-537, 3 sheets, 1975; prepared in cooperation with the Indiana Department of Natural Resources. This map report, describing the water resources in a 1,634-square-mile area of northeastern Indiana, may be purchased for $2.00 per set of 3 sheets, from Branch of Distribution, U.S. Geological Survey, 1200 S. Eads St., Arlington, VA 22202 (check or money order payable to U.S. Geological Survey).

WATER FACTS

1. Unconsolidated glacial deposits as thick as 450 feet underlie the basin. Sand and gravel units within these deposits are the major sources of ground water.
2. Precipitation, the ultimate source of most water in the basin, averages 34.6 inches annually in the study area. This is about 2,690 mgd (million gallons per day).
3. Average streamflow originating within the study area totals about 840 mgd (10.8 inches annually), of which approximately 670 mgd (80 percent) is derived from ground-water seepage into the streams. The natural ground-water movement within the basin is toward the St. Joseph River.
4. Evapotranspiration, averaging 23.8 inches per year (1,850 mgd) in Indiana, is the largest single water use in the basin.
5. About 5,000,000 million gallons of fresh water is in storage within the aquifers.
6. About 74 million gallons of water was used on an average day in 1967. Slightly more than 86 percent of this amount was ground water.
7. All public water systems utilize ground water; they distributed about 40 mgd in 1967.
8. The water table is, in general, a subdued replica of the land surface. The altitude of the water table is highest in the eastern part of the basin and decreases toward the St. Joseph River. Seasonal water-level fluctuations are generally less than 10 feet, except where affected locally by pumping.
9. Ground water is of the calcium magnesium bicarbonate type, is very hard, and has a high iron content. Except for the iron content and the high hardness, ground water is of good chemical quality for most uses.
10. Ground water is available from sources within the basin to supply all foreseeable demands. Farsighted planning, wise management, and efficient design of wells and well fields will be needed to solve problems that will accompany increased water withdrawals.
11. The average surface-water discharge from the basin is 2,020 mgd or 3,130 cfs (cubic feet per second).
12. The maximum observed discharge (18,400 cfs) in the basin occurred on the St. Joseph River at Elkhart on April 5, 1950.
13. On the average, a discharge of about 1,300 cfs can be expected to be equaled or exceeded about 90 percent of the time on the St. Joseph River at Elkhart.

AN ESTIMATED 3,870 MILLION GALLONS OF WATER ENTERS THE BASIN EACH DAY. – ***Of this, 2,020 million gallons (52 percent) replenishes the ground-and surface-water supply; the remainder is returned to the atmosphere through evapotranspiration.***